

**Regulatory Information**

Permit No. ROP No. MI-ROP-B2103-2014d  
 Regulatory Citations 40 CRF 60, Subpart MMMM, Rule 972  
 Regulatory Agency Michigan Department of Environment, Great Lakes, and Energy (EGLE)

**Source Information**

Source Name	Source ID	Target Parameter
Incinerator 7	EUINC 7	NO <sub>x</sub>
Incinerator 8	EUINC 8	NO <sub>x</sub>
Incinerator 9	EUINC 9	NO <sub>x</sub>
Incinerator 10	EUINC 10	NO <sub>x</sub>

**Contact Information**

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Alliance Technical Group, LLC (Alliance) has completed the source testing as described in this report. Results apply only to the source(s) tested and operating condition(s) for the specific test date(s) and time(s) identified within this report. All results are intended to be considered in their entirety, and Alliance is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts, and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free, and legible. Onsite testing was conducted in accordance with approved internal Standard Operating Procedures. Any deviations or problems are detailed in the relevant sections in the test report.

This report is only considered valid once an authorized representative of Alliance has signed in the space provided below; any other version is considered draft. This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

  
\_\_\_\_\_  
**Micheal Kelley**  
Alliance Technical Group, LLC

11/28/23  
\_\_\_\_\_  
Date

**TABLE OF CONTENTS**

1.0 Introduction ..... 1-1

    1.1 Facility Description..... 1-1

    1.2 Emission Unit and Control Unit Descriptions..... 1-1

    1.3 Project Team ..... 1-1

    1.4 Test Protocol & Notification..... 1-1

    1.5 Test Program Notes..... 1-1

2.0 Summary of Results ..... 2-1

3.0 Testing Methodology..... 3-1

    3.1 U.S. EPA Reference Test Method 1 – Sample Point Determination..... 3-1

    3.2 U.S. EPA Reference Test Method 3A – Oxygen/Carbon Dioxide..... 3-1

    3.3 U.S. EPA Reference Test Method 7E – Nitrogen Oxides ..... 3-1

    3.4 Quality Assurance/Quality Control – U.S. EPA Reference Test Methods 3A and 7E..... 3-1

**LIST OF TABLES**

Table 1-1: Project Team ..... 1-1

Table 2-1: Summary of Results EUINC7 ..... 2-1

Table 2-2: Summary of Results EUINC8 ..... 2-1

Table 2-3: Summary of Results EUINC9 ..... 2-2

Table 2-4: Summary of Results EUINC10 ..... 2-2

Table 3-1: Source Testing Methodology ..... 3-1

**APPENDICES**

- Appendix A Sample Calculations
- Appendix B Field Data
- Appendix C Quality Assurance/Quality Control Data
- Appendix D Process Operating/Control System Data
- Appendix E CSV
- Appendix F Test Protocol



**1.0 Introduction**

Alliance Technical Group, LLC (Alliance) was retained by Great Lakes Water Authority (GLWA) to conduct compliance testing at the Water Resource Recovery Facility (WRRF) in Detroit, Michigan (MI). Portions of the facility are subject to 40 Code of Federal Regulations (CFR) Part 60 Subpart Mmmm. The facility operates under the Renewable Operating Permit. (ROP) No. MI-ROP-B2103-2014d. Testing was conducted to determine the emission rate of nitrogen oxides (NOx), at the exhausts of Multiple Hearth Incinerators EUINC7, EUINC8, EUINC9 and EUINC10.

**1.1 Facility Description**

GLWA operates an incineration complex. The incineration complex contains eight sewage sludge incinerators subject to the 40 CFR Part 60, Subpart Mmmm emissions guidelines though Rule 972. Sludge is dewatered with belt filter presses and conveyed to the multiple hearth furnaces with belt conveyors. The sludge conveyors are equipped with weigh scales for continuous monitoring of the amount of sludge being incinerated. The dewatered sludge is introduced at the top hearth and rabbled down through successive hearths in a spiral path. The moisture in the sludge is evaporated in the upper hearths as hot combustion gases traveling concurrently from the middle hearths where combustion takes place. The maximum feed rate is 3.12 dry tons per hour at 25% solids and 75% volatiles condition. It is a continuous feed process. Under normal operating conditions each incinerator runs between 2.0 and 2.5 dry tons per hour with temperature of the solids between 50 and 80 °F. The furnace is equipped with auxiliary natural gas burners at hearths 2, 4, 6, 8, 10, and 12. The firing rate of the burners is modulated by a central control system to sustain the desired hearth temperatures.

**1.2 Emission Unit and Control Unit Descriptions**

Each air pollution control system is comprised of a Double Zero Hearth afterburner section of Hearths 1 and 2, a quench section, and EnviroCare® Venturi-Pak (venturi throat sections and mist eliminator) scrubber system. The total pressure-drop across the wet scrubber ranges between 25 and 40 inches of water column (in. wc). The total scrubber water flow should be greater than 1416 gallons per minute (gpm). Exhaust gases pass through this MHI via an induced draft (ID) fan and exit the scrubber at 100- 150 °F.

**1.3 Project Team**

Personnel involved in this project are identified in the following table.

**Table 1-1: Project Team**

<b>Alliance Personnel</b>	Lucas Chisser Michael Kelley
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**1.4 Test Protocol & Notification**

Testing was conducted in accordance with the test protocol submitted to Michigan Department of Environment, Great Lakes, and Energy (EGLE) by GLWA.

**1.5 Test Program Notes**

Testing was completed without any deviations.

## 2.0 Summary of Results

Alliance conducted compliance testing at the GLWA WRRF facility in Detroit, MI on November 7-8, 2023. Testing consisted of determining the concentration of NO<sub>x</sub> at the exhausts of EUINC7, EUINC8, EUINC9 and EUINC10.

Tables 2-1 through 2-4 provide summaries of the emission testing results with comparisons to the applicable permit limits. Any difference between the summary results listed in the following tables and the detailed results contained in appendices is due to rounding for presentation.

**Table 2-1: Summary of Results EUINC7**

Run Number	Run 1	Run 2	Run 3	Average
Date	11/7/23	11/7/23	11/7/23	
<b>Oxygen Data</b>				
Concentration, % dry	10.0	10.0	9.6	9.9
<b>Carbon Dioxide Data</b>				
Concentration, % dry	7.8	8.0	8.7	8.2
<b>Nitrogen Oxides Data</b>				
Concentration, ppmvd @ 7 % O <sub>2</sub>	135.8	142.6	133.2	137.2
Permit Limit, ppmvd @ 7 % O <sub>2</sub>	--	--	--	220
<b>Percent of Limit, %</b>	--	--	--	<b>62</b>

**Table 2-2: Summary of Results EUINC8**

Run Number	Run 1	Run 2	Run 3	Average
Date	11/7/23	11/7/23	11/7/23	
<b>Oxygen Data</b>				
Concentration, % dry	11.7	11.9	11.7	11.8
<b>Carbon Dioxide Data</b>				
Concentration, % dry	6.8	6.7	6.9	6.8
<b>Nitrogen Oxides Data</b>				
Concentration, ppmvd @ 7 % O <sub>2</sub>	164.7	166.5	188.3	173.2
Permit Limit, ppmvd @ 7 % O <sub>2</sub>	--	--	--	220
<b>Percent of Limit, %</b>	--	--	--	<b>79</b>

Table 2-3: Summary of Results EUINC9

Run Number	Run 1	Run 2	Run 3	Average
Date	11/8/23	11/8/23	11/8/23	
<b>Oxygen Data</b>				
Concentration, % dry	12.4	10.8	12.3	11.8
<b>Carbon Dioxide Data</b>				
Concentration, % dry	6.0	7.2	6.6	6.6
<b>Nitrogen Oxides Data</b>				
Concentration, ppmvd @ 7 % O <sub>2</sub>	154.8	161.7	221.2	179.2
Permit Limit, ppmvd @ 7 % O <sub>2</sub>	--	--	--	220
<b>Percent of Limit, %</b>	--	--	--	<b>81</b>

Table 2-4: Summary of Results EUINC10

Run Number	Run 1	Run 2	Run 3	Average
Date	11/8/23	11/8/23	11/8/23	
<b>Oxygen Data</b>				
Concentration, % dry	13.4	14.1	13.8	13.8
<b>Carbon Dioxide Data</b>				
Concentration, % dry	5.6	5.2	5.3	5.4
<b>Nitrogen Oxides Data</b>				
Concentration, ppmvd @ 7 % O <sub>2</sub>	143.1	157.1	148.2	149.4
Permit Limit, ug ppmvd @ 7 % O <sub>2</sub>	--	--	--	220
<b>Percent of Limit, %</b>	--	--	--	<b>68</b>



### 3.0 Testing Methodology

The emission testing program was conducted in accordance with the test methods listed in Table 3-1. Method descriptions are provided below while quality assurance/quality control data is provided in Appendix C.

**Table 3-1: Source Testing Methodology**

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Sample Point Determination	1	---
Oxygen/Carbon Dioxide	3A	Instrumental Analysis
Nitrogen Oxides	7E	Instrumental Analysis

#### 3.1 U.S. EPA Reference Test Method 1 – Sample Point Determination

The sampling location were evaluated in accordance with U.S. EPA Reference Test Method 1. The upstream and downstream distances were measured and equated to equivalent diameters to confirm compliance with U.S. EPA Reference Test Method 1.

#### 3.2 U.S. EPA Reference Test Method 3A – Oxygen/Carbon Dioxide

The oxygen (O<sub>2</sub>) and carbon dioxide (CO<sub>2</sub>) testing were conducted in accordance with U.S. EPA Reference Test Method 3A. Data was collected online and reported in one-minute averages. The sampling system consisted of a stainless-steel probe, Teflon sample line(s), gas conditioning system and the identified gas analyzer. The gas conditioning system was a non-contact condenser used to remove moisture from the stack gas. If an unheated Teflon sample line was used, then a portable non-contact condenser was placed in the system directly after the probe. Otherwise, a heated Teflon sample line was used. The quality control measures are described in Section 3.4.

#### 3.3 U.S. EPA Reference Test Method 7E – Nitrogen Oxides

The nitrogen oxides (NO<sub>x</sub>) testing was conducted in accordance with U.S. EPA Reference Test Method 7E. Data was collected online and reported in one-minute averages. The sampling system consisted of a stainless-steel probe, Teflon sample line(s), gas conditioning system and the identified gas analyzer. The gas conditioning system was a non-contact condenser used to remove moisture from the stack gas. If an unheated Teflon sample line was used, then a portable non-contact condenser was placed in the system directly after the probe. Otherwise, a heated Teflon sample line was used. The quality control measures are described in Section 3.4.

#### 3.4 Quality Assurance/Quality Control – U.S. EPA Reference Test Methods 3A and 7E

##### *EPA Protocol 1 Calibration Gases*

Cylinder calibration gases used met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates can be found in the Quality Assurance/Quality Control Appendix.

##### *Direct Calibration & Calibration Error Test*

Low Level gas was introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading was stable, the analyzer value was recorded. This process was repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High Level calibration gases were sequentially introduced directly to the analyzer. All values were within 2.0 percent of the Calibration Span or 0.5 ppmv/% absolute difference.

#### *System Bias and Response Time*

High or Mid Level gas (whichever was closer to the stack gas concentration) was introduced at the probe and the time required for the analyzer reading to reach 95 percent or 0.5 ppmv/% (whichever was less restrictive) of the gas concentration was recorded. The analyzer reading was observed until it reached a stable value, and this value was recorded. Next, Low Level gas was introduced at the probe and the time required for the analyzer reading to decrease to a value within 5.0 percent or 0.5 ppmv/% (whichever was less restrictive) was recorded. If the Low-Level gas was zero gas, the response was 0.5 ppmv/% or 5.0 percent of the upscale gas concentration (whichever was less restrictive). The analyzer reading was observed until it reached a stable value and this value was recorded. The measurement system response time and initial system bias were determined from these data. The System Bias was within 5.0 percent of the Calibration Span or 0.5 ppmv/% absolute difference.

#### *Post Test System Bias Checks*

High or Mid Level gas (whichever was closer to the stack gas concentration) was introduced at the probe. After the analyzer response was stable, the value was recorded. Next, Low Level gas was introduced at the probe, and the analyzer value recorded once it reached a stable response. The System Bias was within 5.0 percent of the Calibration Span or 0.5 ppmv/% absolute difference or the data was invalidated and the Calibration Error Test and System Bias were repeated.

#### *Post Test Drift Checks*

Drift between pre- and post-run System Bias was within 3 percent of the Calibration Span or 0.5 ppmv/% absolute difference. If the drift exceeded 3 percent or 0.5 ppmv/%, the Calibration Error Test and System Bias were repeated.

#### *Stratification Check*

To determine the number of sampling points, a gas stratification check was conducted prior to initiating testing. The pollutant concentrations were measured at three points (16.7, 50.0 and 83.3 percent of the measurement line). Each traverse point was sampled for a minimum of twice the system response time.

If the pollutant concentration at each traverse point did not differ more than 5 percent or 0.5 ppmv/0.3% (whichever was less restrictive) of the average pollutant concentration, then single point sampling was conducted during the test runs. If the pollutant concentration did not meet these specifications but differed less than 10 percent or 1.0 ppmv/0.5% from the average concentration, then three (3) point sampling was conducted (stacks less than 7.8 feet in diameter - 16.7, 50.0 and 83.3 percent of the measurement line; stacks greater than 7.8 feet in diameter - 0.4, 1.0, and 2.0 meters from the stack wall). If the pollutant concentration differed by more than 10 percent or 1.0 ppmv/0.5% from the average concentration, then sampling was conducted at a minimum of twelve (12) traverse points. Copies of stratification check data can be found in the Quality Assurance/Quality Control Appendix.

#### *NO<sub>x</sub> Converter Check*

An NO<sub>2</sub> – NO converter check was performed on the analyzer prior to initiating testing and at the completion of testing. An approximately 50 ppm nitrogen dioxide cylinder gas was introduced directly to the NO<sub>x</sub> analyzer and the instrument response was recorded in an electronic data sheet. The instrument response was within +/- 10 percent of the cylinder concentration.



*Data Collection*

A Data Acquisition System with battery backup was used to record the instrument response in one (1) minute averages. The data was continuously stored as a \*.CSV file in Excel format on the hard drive of a computer. At the completion of testing, the data was also saved to the Alliance server. All data was reviewed by the Field Team Leader before leaving the facility. Once arriving at Alliance's office, all written and electronic data was relinquished to the report coordinator and then a final review was performed by the Project Manager.

Location: Great Lakes Water Authority - Detroit, MI

Source: Incinerator 7 (EUINC 7)

Project No.: AST-2023-1997

Run No. /Method Run 1 / Method 3A

O<sub>2</sub> - Outlet Concentration (C<sub>O<sub>2</sub></sub>), % dry

$$C_{O_2} = (C_{obs} - C_0) \times \left( \frac{C_{MA}}{C_M - C_0} \right)$$

where,

<u>C<sub>obs</sub></u>	<u>9.96</u>	= average analyzer value during test, % dry
<u>C<sub>0</sub></u>	<u>0.01</u>	= average of pretest & posttest zero responses, % dry
<u>C<sub>MA</sub></u>	<u>9.86</u>	= actual concentration of calibration gas, % dry
<u>C<sub>M</sub></u>	<u>9.80</u>	= average of pretest & posttest calibration responses, % dry
<u>C<sub>O<sub>2</sub></sub></u>	<u>10.0</u>	= O <sub>2</sub> Concentration, % dry



Location: Great Lakes Water Authority - Detroit, MI

Source: Incinerator 7 (EUINC 7)

Project No.: AST-2023-1997

Run No. /Method Run 1 / Method 3A

CO<sub>2</sub> - Outlet Concentration (C<sub>CO<sub>2</sub></sub>), % dry

$$C_{CO_2} = (C_{obs} - C_0) \times \left( \frac{C_{MA}}{C_M - C_0} \right)$$

where,

<u>C<sub>obs</sub></u>	<u>8.06</u>	= average analyzer value during test, % dry
<u>C<sub>0</sub></u>	<u>0.12</u>	= average of pretest & posttest zero responses, % dry
<u>C<sub>MA</sub></u>	<u>10.18</u>	= actual concentration of calibration gas, % dry
<u>C<sub>M</sub></u>	<u>10.48</u>	= average of pretest & posttest calibration responses, % dry
<u>C<sub>CO<sub>2</sub></sub></u>	<u>7.8</u>	= CO <sub>2</sub> Concentration, % dry



**Location:** Great Lakes Water Authority - Detroit, MI

**Source:** Incinerator 7 (EUINC 7)

**Project No.:** AST-2023-1997

**Run No. /Method** Run 1 / Method 7E

**NO<sub>x</sub> - Outlet Concentration (C<sub>NO<sub>x</sub></sub>), ppmvd**

$$C_{NOx} = (C_{obs} - C_0) \times \left( \frac{C_{MA}}{C_M - C_0} \right)$$

where,

$C_{obs}$	<u>106.70</u>	= average analyzer value during test, ppmvd
$C_0$	<u>4.84</u>	= average of pretest & posttest zero responses, ppmvd
$C_{MA}$	<u>110.60</u>	= actual concentration of calibration gas, ppmvd
$C_M$	<u>110.82</u>	= average of pretest & posttest calibration responses, ppmvd
$C_{NOx}$	<u>106.30</u>	= NO <sub>x</sub> Concentration, ppmvd

**NO<sub>x</sub> - Outlet Concentration (C<sub>NO<sub>x</sub>c7</sub>), ppmvd @ 7% O<sub>2</sub>**

$$C_{NOxc7} = C_{NOx} \times \left( \frac{20.9 - 7}{20.9 - O_2} \right)$$

where,

$C_{NOx}$	<u>106.30</u>	= NO <sub>x</sub> - Outlet Concentration, ppmvd
$C_{O_2}$	<u>10.02</u>	= oxygen concentration, %
$C_{NOxc7}$	<u>135.8</u>	= ppmvd @7% O <sub>2</sub>



Emissions Calculations

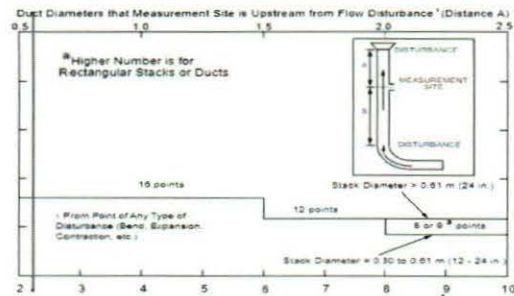
Location Great Lakes Water Authority - Detroit, MI  
 Source Incinerator 7 (EUINC 7)  
 Project No. AST-2023-1997

Run Number		Run 1	Run 2	Run 3	Average
Date		11/7/23	11/7/23	11/7/23	--
Start Time		8:30	9:50	11:05	--
Stop Time		9:30	10:50	12:05	--
<b>Calculated Data - Outlet</b>					
O <sub>2</sub> Concentration, % dry	C <sub>O<sub>2</sub></sub>	10.0	10.0	9.6	9.9
CO <sub>2</sub> Concentration, % dry	C <sub>CO<sub>2</sub></sub>	7.8	8.0	8.7	8.2
NO <sub>x</sub> Concentration, ppmvd	C <sub>NO<sub>x</sub></sub>	106.3	111.8	108.3	108.8
NO <sub>x</sub> Concentration, ppmvd @ 7 % O <sub>2</sub>	C <sub>NO<sub>x</sub>7</sub>	135.8	142.6	133.2	137.2

Location Great Lakes Water Authority - Detroit, MI  
 Source Incinerator 7 (EUINC 7)  
 Project No. AST-2023-1997  
 Date: 11/07/23

### Stack Parameters

Duct Orientation: Vertical  
 Duct Design: Circular  
 Distance from Far Wall to Outside of Port: 57.00 in  
 Nipple Length: 3.00 in  
 Depth of Duct: 54.00 in  
 Width of Duct: 54.00 in  
 Cross Sectional Area of Duct: 15.90 ft<sup>2</sup>  
 Equivalent Diameter: 54.00 in  
 No. of Test Ports: 1  
 Number of Readings per Point: 1  
 Distance A: 14.0 ft  
 Distance A Duct Diameters: 3.1 (must be ≥ 0.5)  
 Distance B: 10.0 ft  
 Distance B Duct Diameters: 2.2 (must be ≥ 2)  
 Actual Number of Traverse Points: 3  
 Measurer (Initial and Date): MFK,LAC 11/6/23  
 Reviewer (Initial and Date): MFK,LAC 11/6/23



### CIRCULAR DUCT

#### LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

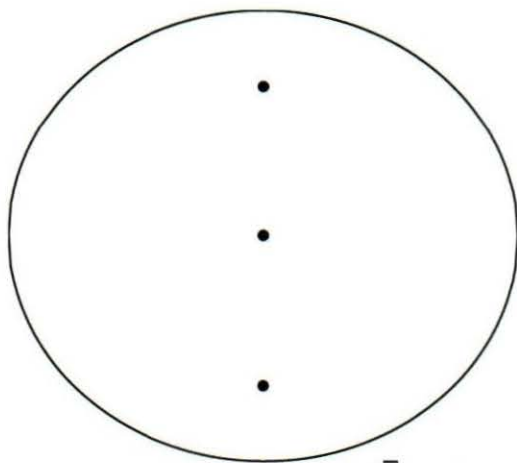
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	16.7	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	50.0	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	83.3	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	16.7	9.02	12.02
2	50.0	27.00	30.00
3	83.3	44.98	47.98
4	--	--	--
5	--	--	--
6	--	--	--
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

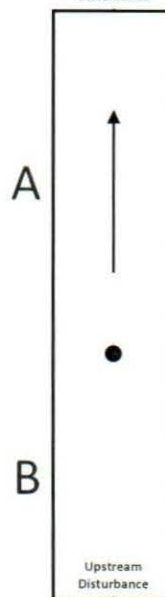
\*Percent of stack diameter from inside wall to traverse point.

Stack Diagram  
 A = 14 ft.  
 B = 10 ft.  
 Depth of Duct = 54 in.

Cross Sectional Area



Downstream Disturbance





Location: Great Lakes Water Authority - Detroit, MI  
 Source: Incinerator 7 (EUNIC 7)  
 Project No.: AST-2023-1997  
 Date: 11/7/23

Time Unit Status	O <sub>2</sub> - Outlet % dry Valid	CO <sub>2</sub> - Outlet % dry Valid	NO <sub>x</sub> - Outlet ppmvd Valid
Uncorrected Run Average (C <sub>obs</sub> )	9.96	8.06	106.70
Cal Gas Concentration (C <sub>MA</sub> )	9.86	10.18	110.60
Pretest System Zero Response	0.00	0.10	6.11
Posttest System Zero Response	0.02	0.14	3.57
Average Zero Response (C <sub>0</sub> )	0.01	0.12	4.84
Pretest System Cal Response	9.77	10.46	111.59
Posttest System Cal Response	9.83	10.49	110.05
Average Cal Response (C <sub>M</sub> )	9.80	10.48	110.82
Corrected Run Average (C <sub>corr</sub> )	10.02	7.80	106.30
8:30	12.25	5.96	110.08
8:31	12.27	5.97	105.55
8:32	12.2	6.03	107.56
8:33	12.16	6.1	104.11
8:34	12.1	6.15	103.08
8:35	12.01	6.22	104.57
8:36	11.96	6.37	107.09
8:37	11.85	6.42	102.07
8:38	11.68	6.53	112.04
8:39	11.64	6.55	105.6
8:40	11.58	6.62	105.08
8:41	11.44	6.64	103.1
8:42	11.23	6.48	108.59
8:43	11.11	6.81	104.05
8:44	11.05	6.83	104.09
8:45	10.98	6.84	112.08
8:46	10.88	6.88	106.58
8:47	10.98	6.84	112.57
8:48	10.95	6.83	104.56
8:49	10.88	6.9	105.02
8:50	10.96	6.96	105.09
8:51	10.95	6.98	111.07
8:52	10.75	7.22	105.06
8:53	10.39	7.5	114.1
8:54	10.31	7.66	106.57
8:55	9.88	7.96	108.12
8:56	9.52	8.29	105.09
8:57	9.78	8.24	108.06
8:58	8.49	9.07	107.08
8:59	8.21	9.35	113.58
9:00	8.43	9.39	107.56
9:01	8.46	9.23	110.06
9:02	8.39	9.31	111.55
9:03	9.09	8.84	107.06
9:04	9.13	8.7	103.08
9:05	8.99	8.74	106.06
9:06	8.88	8.87	105.08
9:07	8.8	8.91	104.59
9:08	9.21	8.74	105.59
9:09	9.31	8.72	105.07
9:10	9.56	8.6	101.59
9:11	9.42	8.73	103.62
9:12	9.18	8.98	113.56
9:13	8.64	9.31	105.57
9:14	8.73	9.39	103.07
9:15	8.9	9.28	102.06
9:16	8.8	9.33	107.12
9:17	8.77	9.4	109.11
9:18	8.66	9.52	108.59
9:19	8.5	9.59	105.08
9:20	8.59	9.62	103.87
9:21	8.57	9.58	104.57
9:22	8.55	9.56	104.71
9:23	8.79	9.39	106.63
9:24	8.74	9.4	107.08
9:25	8.93	9.31	104.61
9:26	9.03	9.14	110.1
9:27	9.13	9.02	107.1
9:28	9.85	8.55	105.56
9:29	8.86	9.12	111.57

Location: Great Lakes Water Authority - Detroit, MI

Source: Incinerator 7 (EUNIC 7)

Project No.: AST-2023-1997

Date: 11/7/23

Time Unit Status	O <sub>2</sub> - Outlet % dry Valid	CO <sub>2</sub> - Outlet % dry Valid	NO <sub>x</sub> - Outlet ppmvd Valid
Uncorrected Run Average (C <sub>obs</sub> )	9.97	8.25	113.27
Cal Gas Concentration (C <sub>MA</sub> )	9.86	10.18	110.60
Pretest System Zero Response	0.02	0.14	3.57
Posttest System Zero Response	0.03	0.14	3.02
Average Zero Response (C <sub>0</sub> )	0.03	0.14	3.30
Pretest System Cal Response	9.83	10.49	110.05
Posttest System Cal Response	9.84	10.46	114.14
Average Cal Response (C <sub>M</sub> )	9.84	10.48	112.10
Corrected Run Average (Corr)	10.00	7.99	111.80
9:50	10.39	8.02	111.05
9:51	10.43	8.11	114.05
9:52	10.62	8.1	112.56
9:53	10.61	8.09	112.05
9:54	10.53	8.19	117.1
9:55	10.31	8.25	110.52
9:56	10.33	8.29	112.57
9:57	10.36	8.17	113.09
9:58	10.3	8.18	112.55
9:59	10.04	8.27	111.04
10:00	9.71	8.22	108.05
10:01	9.66	8.49	112.51
10:02	9.67	8.5	111.07
10:03	9.51	8.55	119.03
10:04	9.48	8.59	113.04
10:05	9.59	8.52	108.52
10:06	9.7	8.47	111.54
10:07	9.8	8.42	110.59
10:08	9.68	8.41	111.49
10:09	9.71	8.39	113.55
10:10	9.79	8.36	112
10:11	9.83	8.38	111.03
10:12	9.75	8.43	118.57
10:13	9.77	8.45	109.08
10:14	9.9	8.43	110.04
10:15	10.01	8.4	110.03
10:16	10.08	8.36	111.55
10:17	10.4	7.87	111.07
10:18	9.96	8.5	110.02
10:19	9.95	8.52	110.56
10:20	10	8.47	111.09
10:21	10.08	8.39	119.56
10:22	10.13	8.35	111.56
10:23	10.41	8.22	108.07
10:24	10.54	8.08	112.07
10:25	10.7	7.89	113.55
10:26	11	7.65	114.56
10:27	11.28	7.39	113.09
10:28	11.45	7.23	121.04
10:29	11.34	7.11	110.62
10:30	11.54	7.08	112.07
10:31	11.2	7.25	119.07
10:32	11.08	7.38	110.57
10:33	11.01	6.92	111.06
10:34	11.26	7.26	115.52
10:35	10.64	7.57	113.54
10:36	10.53	7.65	113.02
10:37	10.25	7.84	111.56
10:38	10.09	7.93	118.53
10:39	10.04	7.87	114.08
10:40	9.57	8.23	115.07
10:41	9.4	8.35	112.56
10:42	9.11	8.54	119.07
10:43	8.76	8.76	119.56
10:44	8.47	9.06	116.53
10:45	8.31	9.29	114.59
10:46	7.79	9.67	117.08
10:47	7.46	10.04	114.54
10:48	7.87	10.16	114.54
10:49	7.28	9.6	118.57

Location: Great Lakes Water Authority - Detroit, MI  
 Source: Incinerator 7 (EUINC 7)  
 Project No.: AST-2023-1997  
 Date: 11/7/23

Time Unit Status	O <sub>2</sub> - Outlet % dry Valid	CO <sub>2</sub> - Outlet % dry Valid	NO <sub>x</sub> - Outlet ppmvd Valid
Uncorrected Run Average (C <sub>obs</sub> )	9.60	8.94	109.59
Cal Gas Concentration (C <sub>MA</sub> )	9.86	10.18	110.60
Pretest System Zero Response	0.03	0.14	3.02
Posttest System Zero Response	0.02	0.14	3.52
Average Zero Response (C <sub>0</sub> )	0.03	0.14	3.27
Pretest System Cal Response	9.84	10.46	114.14
Posttest System Cal Response	9.88	10.34	109.52
Average Cal Response (C <sub>M</sub> )	9.86	10.40	111.83
Corrected Run Average (Corr)	9.59	8.73	108.32
11:05	10.6	8.06	113.58
11:06	10.19	8.5	111.06
11:07	10.43	8.56	110.56
11:08	10.86	8.1	110.6
11:09	10.87	8.14	109.54
11:10	10.98	7.9	118.05
11:11	10.15	8.57	110.48
11:12	10.48	8.29	114.53
11:13	11.01	7.86	109.53
11:14	11.59	7.34	109.54
11:15	11.76	7.26	111.02
11:16	11.5	7.37	111
11:17	10.87	7.87	109.04
11:18	10.6	8.01	116.99
11:19	10.95	7.88	110.05
11:20	9.97	8.44	109.08
11:21	9.58	8.71	111.02
11:22	9.51	8.83	108.51
11:23	9.53	8.82	110.51
11:24	9.35	8.98	106.54
11:25	9.24	9.05	108.56
11:26	9.36	9.05	108.99
11:27	9.34	9.06	108.02
11:28	9.64	8.91	107.53
11:29	9.77	8.78	107.53
11:30	9.89	8.65	114.52
11:31	9.87	8.7	109.49
11:32	10.02	8.54	114.57
11:33	9.93	8.56	110.58
11:34	9.9	8.61	113.02
11:35	10.52	8.33	109.07
11:36	9.72	8.72	109.51
11:37	9.58	8.8	116.51
11:38	9.57	8.84	109.49
11:39	9.48	8.85	113.06
11:40	9.33	9.04	109.05
11:41	9.13	9.24	105.06
11:42	9.02	9.37	106.04
11:43	8.84	9.42	109.04
11:44	8.66	9.57	107.05
11:45	8.37	9.8	109.56
11:46	8.24	9.85	107.07
11:47	8	9.97	110.01
11:48	7.94	9.95	106.53
11:49	8.34	9.65	111.55
11:50	8.08	9.8	107.53
11:51	7.88	10.11	106.57
11:52	8.1	10.03	105.52
11:53	7.84	10.23	105.99
11:54	7.39	10.59	105.06
11:55	7.52	10.72	106.55
11:56	7.47	10.79	104.59
11:57	7.51	10.86	113.04
11:58	7.91	10.58	106.04
11:59	8.38	10.3	111.04
12:00	9.01	9.7	106.58
12:01	10.46	9	109.54
12:02	11.44	7.98	104.54
12:03	11.82	7.63	113.01
12:04	12.43	7.17	107.04





Emissions Calculations

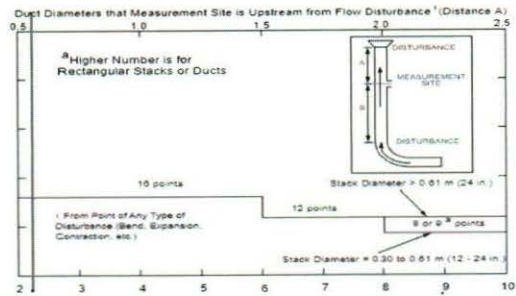
Location Great Lakes Water Authority - Detroit, MI  
 Source Incinerator 8 (EUINC 8)  
 Project No. AST-2023-1997

Run Number		Run 1	Run 2	Run 3	Average
Date		11/7/23	11/7/23	11/7/23	--
Start Time		12:28	13:50	15:05	--
Stop Time		13:28	14:50	16:05	--
<b>Calculated Data - Outlet</b>					
O <sub>2</sub> Concentration, % dry	C <sub>O<sub>2</sub></sub>	11.7	11.9	11.7	11.8
CO <sub>2</sub> Concentration, % dry	C <sub>CO<sub>2</sub></sub>	6.8	6.7	6.9	6.8
NO <sub>x</sub> Concentration, ppmvd	C <sub>NO<sub>x</sub></sub>	109.2	107.4	124.3	113.6
NO <sub>x</sub> Concentration, ppmvd @ 7 % O <sub>2</sub>	C <sub>NO<sub>x</sub>7</sub>	164.7	166.5	188.3	173.2

Location Great Lakes Water Authority - Detroit, MI  
 Source Incinerator 8 (EUINC 8)  
 Project No. AST-2023-1997  
 Date: 11/07/23

### Stack Parameters

Duct Orientation: Vertical  
 Duct Design: Circular  
 Distance from Far Wall to Outside of Port: 57.00 in  
 Nipple Length: 3.00 in  
 Depth of Duct: 54.00 in  
 Width of Duct: 54.00 in  
 Cross Sectional Area of Duct: 15.90 ft<sup>2</sup>  
 Equivalent Diameter: 54.00 in  
 No. of Test Ports: 1  
 Number of Readings per Point: 1  
 Distance A: 14.0 ft  
 Distance A Duct Diameters: 3.1 (must be ≥ 0.5)  
 Distance B: 10.0 ft  
 Distance B Duct Diameters: 2.2 (must be ≥ 2)  
 Actual Number of Traverse Points: 3  
 Measurer (Initial and Date): MFK/LAC 11/6/23  
 Reviewer (Initial and Date): MFK/LAC 11/6/23

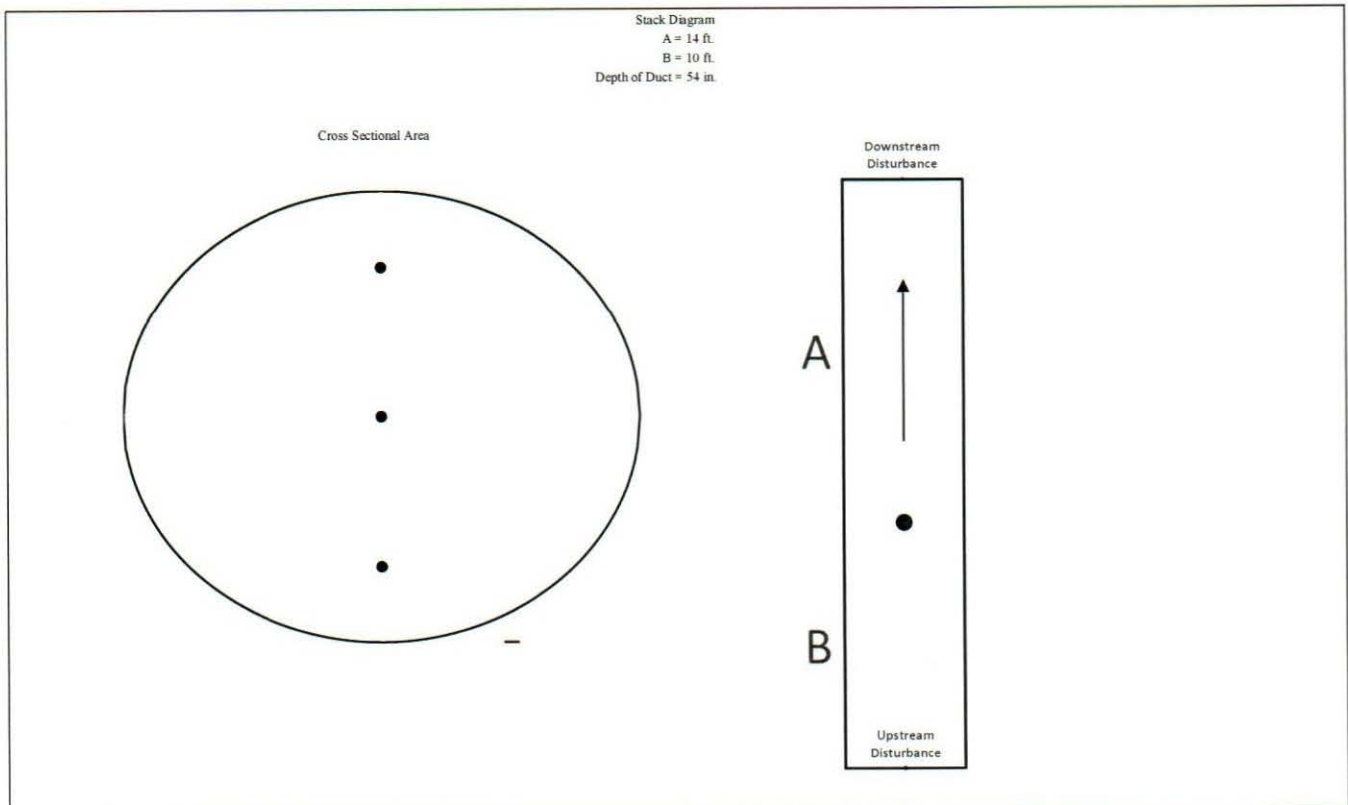


### CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS											
Number of traverse points on a diameter											
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	16.7	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	50.0	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	83.3	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	16.7	9.02	12.02
2	50.0	27.00	30.00
3	83.3	44.98	47.98
4	--	--	--
5	--	--	--
6	--	--	--
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

\*Percent of stack diameter from inside wall to traverse point.



Location: Great Lakes Water Authority - Detroit, MI  
 Source: Incinerator 8 (EUIINC 8)  
 Project No.: AST-2023-1997  
 Date: 11/7/23

Time Unit Status	O <sub>2</sub> - Outlet % dry Valid	CO <sub>2</sub> - Outlet % dry Valid	NO <sub>x</sub> - Outlet ppmvd Valid
Uncorrected Run Average (C <sub>obs</sub> )	11.68	7.00	108.67
Cal Gas Concentration (C <sub>MA</sub> )	9.86	10.18	110.60
Pretest System Zero Response	0.02	0.14	3.52
Posttest System Zero Response	0.29	0.29	2.67
Average Zero Response (C <sub>0</sub> )	0.16	0.22	3.10
Pretest System Cal Response	9.88	10.34	109.53
Posttest System Cal Response	9.88	10.48	110.56
Average Cal Response (C <sub>M</sub> )	9.88	10.41	110.05
Corrected Run Average (Corr)	11.69	6.77	109.18
12:28	11.45	7.21	105.02
12:29	11.47	7.18	114.03
12:30	11.96	6.88	110.58
12:31	11.85	6.84	109.1
12:32	11.86	6.85	114.01
12:33	11.79	6.88	108.55
12:34	11.64	6.98	113.55
12:35	11.58	6.88	110.31
12:36	11.82	6.89	110.82
12:37	11.96	6.77	108.63
12:38	11.97	6.72	102.63
12:39	11.77	6.83	106.64
12:40	11.66	6.95	102.62
12:41	11.47	7.1	104.28
12:42	11.39	7.13	111.51
12:43	11.39	7.17	108.54
12:44	11.43	7.18	105.06
12:45	11.7	7.05	104.14
12:46	11.83	6.91	103.56
12:47	11.76	6.9	108.57
12:48	11.8	6.87	108.07
12:49	11.66	6.97	106.04
12:50	11.81	6.74	111.56
12:51	11.62	6.99	110.54
12:52	11.63	6.97	107.56
12:53	11.81	6.81	106.52
12:54	11.77	6.83	103.04
12:55	11.91	6.84	108.56
12:56	11.92	6.83	116.02
12:57	11.71	6.81	109.02
12:58	11.81	6.77	108.04
12:59	11.95	6.76	109.55
13:00	11.87	6.69	108.52
13:01	12.03	6.64	110.55
13:02	11.86	6.76	110.04
13:03	11.63	6.88	113.07
13:04	11.73	6.94	107
13:05	11.68	6.8	108.01
13:06	11.53	7.08	107.53
13:07	11.48	7.11	110.55
13:08	11.53	7.11	107.5
13:09	11.75	6.96	103.55
13:10	11.69	6.92	109.07
13:11	11.73	6.9	102.04
13:12	11.66	6.99	114.07
13:13	11.71	7.07	101.52
13:14	11.7	7.06	106.03
13:15	11.66	7.07	107.53
13:16	11.64	7.08	106.54
13:17	11.67	7.11	105.02
13:18	11.91	7.07	105.05
13:19	11.87	7.06	115.01
13:20	11.45	7.32	111.52
13:21	11.54	7.32	116.03
13:22	11.48	7.31	112.07
13:23	11.4	7.36	110.54
13:24	11.5	7.36	111.51
13:25	11.4	7.39	112.51
13:26	11.4	7.42	110.07
13:27	11.35	7.43	111.04

Location: Great Lakes Water Authority - Detroit, MI  
 Source: Incinerator 8 (EUINC 8)  
 Project No.: AST-2023-1997  
 Date: 11/7/23

Time Unit Status	O <sub>2</sub> - Outlet % dry Valid	CO <sub>2</sub> - Outlet % dry Valid	NO <sub>x</sub> - Outlet ppmvd Valid
Uncorrected Run Average (C <sub>obs</sub> )	11.90	7.04	106.83
Cal Gas Concentration (C <sub>M,A</sub> )	9.86	10.18	110.60
Pretest System Zero Response	0.29	0.29	2.67
Posttest System Zero Response	0.16	0.36	3.43
Average Zero Response (C <sub>0</sub> )	0.23	0.33	3.05
Pretest System Cal Response	9.88	10.48	110.56
Posttest System Cal Response	9.86	10.54	109.25
Average Cal Response (C <sub>M</sub> )	9.87	10.51	109.91
Corrected Run Average (C <sub>corr</sub> )	11.93	6.71	107.42
13:50	11.43	7.05	108.06
13:51	11.5	7.13	103.08
13:52	11.35	7.24	104.04
13:53	11.33	7.32	105.58
13:54	11.26	7.38	103.09
13:55	11.16	7.44	105.1
13:56	11.34	7.44	105.54
13:57	11.19	7.46	104.09
13:58	11.25	7.5	103.09
13:59	11.3	7.5	102.56
14:00	11.55	7.28	106.04
14:01	11.62	7.35	108.5
14:02	11.94	7.12	105.55
14:03	12.03	7.05	104.04
14:04	12.14	6.97	104.54
14:05	12.31	6.74	103.56
14:06	12.43	6.7	106.58
14:07	12.46	6.65	111.08
14:08	12.56	6.6	107.08
14:09	12.6	6.56	107.04
14:10	12.7	6.44	106.57
14:11	12.87	6.31	110.55
14:12	12.61	6.39	106.6
14:13	12.34	6.6	107.56
14:14	12.23	6.78	106.04
14:15	12.25	6.81	106.53
14:16	12.34	6.75	106.08
14:17	12.46	6.61	107.02
14:18	12.42	6.66	106.09
14:19	12.35	6.75	108.53
14:20	12.36	6.76	106.05
14:21	12.21	6.84	107.57
14:22	12.01	6.97	106.07
14:23	11.97	7.04	106.09
14:24	11.99	7	105.04
14:25	11.99	7.04	107.55
14:26	11.99	7.01	105.54
14:27	11.97	7.08	110.56
14:28	12.01	6.98	107.05
14:29	12.07	6.98	111.08
14:30	11.96	6.96	106.57
14:31	12.15	6.9	106.53
14:32	12.13	6.89	106.12
14:33	12	6.98	107.09
14:34	11.79	7.11	110.08
14:35	11.63	7.17	106.52
14:36	11.31	7.49	107.56
14:37	11.39	7.46	107.53
14:38	11.28	7.58	107.06
14:39	11.23	7.57	111.05
14:40	11.4	7.47	110.55
14:41	11.52	7.37	107.48
14:42	11.65	7.26	107.52
14:43	11.75	7.17	107.53
14:44	11.7	7.17	107.05
14:45	11.77	7.1	111.05
14:46	11.84	7.05	106.05
14:47	11.8	7.09	111.03
14:48	11.86	7.1	105.54
14:49	11.82	7.02	107.55



Location: Great Lakes Water Authority - Detroit, MI  
 Source: Incinerator 8 (EUNIC 8)  
 Project No.: AST-2023-1997  
 Date: 11/7/23

Time Unit Status	O <sub>2</sub> - Outlet % dry Valid	CO <sub>2</sub> - Outlet % dry Valid	NO <sub>x</sub> - Outlet ppmvd Valid
Uncorrected Run Average (C <sub>obs</sub> )	11.70	7.24	122.78
Cal Gas Concentration (C <sub>MA</sub> )	9.86	10.18	110.60
Pretest System Zero Response	0.16	0.36	3.43
Posttest System Zero Response	0.10	0.20	1.17
Average Zero Response (C <sub>0</sub> )	0.13	0.28	2.30
Pretest System Cal Response	9.86	10.54	109.25
Posttest System Cal Response	9.86	10.52	109.72
Average Cal Response (C <sub>vt</sub> )	9.86	10.53	109.49
Corrected Run Average (Corr)	11.72	6.91	124.31
15:05	12.5	6.68	130.78
15:06	12.46	6.69	132.77
15:07	12.62	6.5	137.69
15:08	12.7	6.5	137.79
15:09	12.7	6.47	138.8
15:10	12.74	6.48	140.7
15:11	12.72	6.48	142.42
15:12	12.64	6.49	137.17
15:13	12.56	6.6	134.68
15:14	12.52	6.61	131.19
15:15	12.38	6.79	128.63
15:16	12.17	6.89	129.75
15:17	11.95	7.1	129.66
15:18	11.78	7.17	128.33
15:19	11.72	7.23	126.75
15:20	11.72	7.27	126.75
15:21	11.55	7.39	122.26
15:22	11.43	7.53	124.77
15:23	11.3	7.63	122.76
15:24	11.22	7.67	123.75
15:25	11.08	7.79	122.26
15:26	11	7.86	118.75
15:27	10.66	8.14	116.79
15:28	10.62	8.25	113.69
15:29	10.36	8.44	113.28
15:30	10.45	8.42	113.24
15:31	11.3	7.7	131.66
15:32	11.57	7.52	135.79
15:33	11.96	7.16	141.71
15:34	12.32	6.85	144.16
15:35	12.44	6.71	145.76
15:36	12.59	6.56	149.23
15:37	12.79	6.38	147.34
15:38	12.93	6.31	143.3
15:39	12.97	6.18	143.75
15:40	13.26	5.99	142.64
15:41	13.29	5.95	140.74
15:42	13.2	5.94	139.84
15:43	13.1	6.08	135.74
15:44	13.17	6.06	131.75
15:45	13.09	6.01	127.7
15:46	13.28	5.85	128.31
15:47	12.78	6.04	124.72
15:48	12.44	6.4	118.75
15:49	12.33	6.43	114.73
15:50	11.03	7.04	111.35
15:51	10.21	8	105.72
15:52	9.58	8.47	98.32
15:53	9.06	8.98	90.24
15:54	8.82	9.25	84.31
15:55	10.37	8.62	88.75
15:56	10.79	8.1	101.75
15:57	10.7	8.19	106.34
15:58	10.69	8.24	103.12
15:59	10.45	8.43	96.26
16:00	10.77	8.31	92.76
16:01	11	8.06	97.72
16:02	10.77	8.08	102.76
16:03	9.99	8.36	100.33
16:04	9.3	9.1	73.74



Emissions Calculations

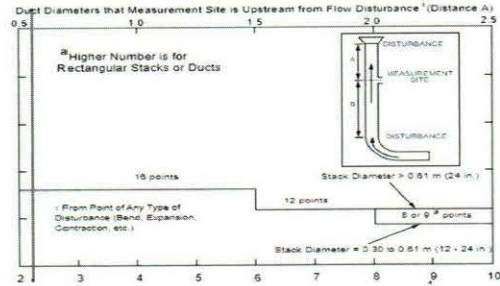
Location Great Lakes Water Authority - Detroit, MI  
 Source Incinerator 9 (EUINC 9)  
 Project No. AST-2023-1997

Run Number		Run 1	Run 2	Run 3	Average
Date		11/8/23	11/8/23	11/8/23	--
Start Time		9:00	10:15	11:30	--
Stop Time		10:00	11:15	12:30	--
<b>Calculated Data - Outlet</b>					
O <sub>2</sub> Concentration, % dry	C <sub>O<sub>2</sub></sub>	12.37	10.82	12.31	11.83
CO <sub>2</sub> Concentration, % dry	C <sub>CO<sub>2</sub></sub>	5.98	7.24	6.64	6.62
NO <sub>x</sub> Concentration, ppmvd	C <sub>NO<sub>x</sub></sub>	95.00	117.23	136.63	116.29
NO <sub>x</sub> Concentration, ppmvd @ 7 % O <sub>2</sub>	C <sub>NO<sub>x</sub>7</sub>	154.8	161.7	221.2	179.2

Location Great Lakes Water Authority - Detroit, MI  
 Source Incinerator 9 (EUNIC 9)  
 Project No. AST-2023-1997  
 Date: 11/08/23

### Stack Parameters

Duct Orientation: Vertical  
 Duct Design: Circular  
 Distance from Far Wall to Outside of Port: 57.00 in  
 Nipple Length: 3.00 in  
 Depth of Duct: 54.00 in  
 Width of Duct: 54.00 in  
 Cross Sectional Area of Duct: 15.90 ft<sup>2</sup>  
 Equivalent Diameter: 54.00 in  
 No. of Test Ports: 1  
 Number of Readings per Point: 1  
 Distance A: 14.0 ft  
 Distance A Duct Diameters: 3.1 (must be ≥ 0.5)  
 Distance B: 10.0 ft  
 Distance B Duct Diameters: 2.2 (must be ≥ 2)  
 Actual Number of Traverse Points: 3  
 Measurer (Initial and Date): MFK/LAC 11/7/23  
 Reviewer (Initial and Date): MFK/LAC 11/7/23

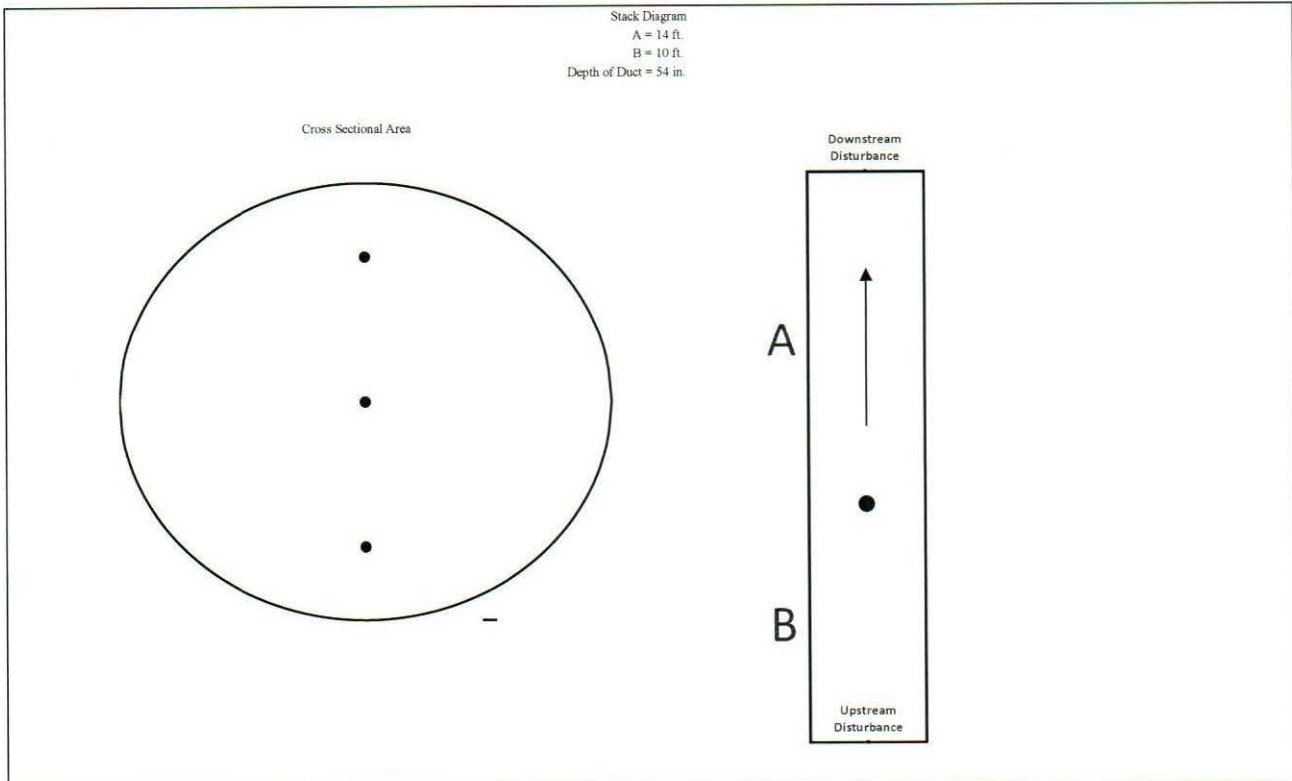


### CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS												
Number of traverse points on a diameter												
	2	3	4	5	6	7	8	9	10	11	12	
1	14.6	16.7	6.7	--	4.4	--	3.2	--	2.6	--	2.1	
2	85.4	50.0	25.0	--	14.6	--	10.5	--	8.2	--	6.7	
3	--	83.3	75.0	--	29.6	--	19.4	--	14.6	--	11.8	
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7	
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0	
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6	
7	--	--	--	--	--	--	77.4	--	77.4	--	64.4	
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0	
9	--	--	--	--	--	--	--	--	91.8	--	82.3	
10	--	--	--	--	--	--	--	--	97.4	--	88.2	
11	--	--	--	--	--	--	--	--	--	--	93.3	
12	--	--	--	--	--	--	--	--	--	--	97.9	

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	16.7	9.02	12.02
2	50.0	27.00	30.00
3	83.3	44.98	47.98
4	--	--	--
5	--	--	--
6	--	--	--
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

\*Percent of stack diameter from inside wall to traverse point.



Location: Great Lakes Water Authority - Detroit, MI  
 Source: Incinerator 9 (EUNIC 9)  
 Project No.: AST-2023-1997  
 Date: 11/8/23

Time Unit Status	O <sub>2</sub> - Outlet % dry Valid	CO <sub>2</sub> - Outlet % dry Valid	NOx - Outlet ppmvd Valid
Uncorrected Run Average (C <sub>obs</sub> )	12.23	6.15	96.88
Cal Gas Concentration (C <sub>MA</sub> )	9.86	10.18	110.60
Pretest System Zero Response	0.11	0.08	2.86
Posttest System Zero Response	0.24	0.28	3.44
Average Zero Response (C <sub>0</sub> )	0.18	0.18	3.15
Pretest System Cal Response	9.82	10.39	113.49
Posttest System Cal Response	9.75	10.32	111.05
Average Cal Response (C <sub>M</sub> )	9.79	10.36	112.27
Corrected Run Average (C <sub>corr</sub> )	12.37	5.98	95.00
9:00	12.3	5.71	69.04
9:01	12.24	5.7	86.19
9:02	12.22	5.68	92.33
9:03	13.04	5.53	94.85
9:04	13.29	5.3	96.39
9:05	13.45	5.17	97.83
9:06	13.5	5.15	99.28
9:07	13.59	5.08	99.3
9:08	13.55	5.07	98.87
9:09	13.54	5.1	98.82
9:10	13.61	5.05	95.28
9:11	13.52	5.12	99.76
9:12	13.57	5.06	101.91
9:13	13.58	5.07	102.29
9:14	13.67	5.03	103.94
9:15	13.54	5.07	105.42
9:16	13.66	5.01	102.94
9:17	13.69	5.01	102.34
9:18	13.65	5.04	102.95
9:19	13.66	5.05	102.35
9:20	13.61	5.05	103.96
9:21	13.53	5.07	102.92
9:22	13.47	5.13	102.41
9:23	13.4	5.13	102.41
9:24	13.3	5.21	102.37
9:25	13.29	5.21	101.84
9:26	12.83	5.49	96.86
9:27	12.88	5.55	99.94
9:28	12.76	5.64	100.92
9:29	12.57	5.76	99.93
9:30	12.53	5.86	100.42
9:31	12.45	5.93	99.86
9:32	12.25	6.08	99.93
9:33	12.09	6.25	97.87
9:34	11.84	6.43	96.31
9:35	11.6	6.63	93.8
9:36	11.34	6.88	90.85
9:37	10.94	7.18	88.18
9:38	10.65	7.41	86.26
9:39	10.53	7.55	83.81
9:40	10.33	7.76	81.69
9:41	10.11	7.95	78.7
9:42	10.21	7.88	74.68
9:43	9.65	8.26	78.2
9:44	9.65	8.34	79.68
9:45	9.55	8.46	82.8
9:46	9.52	8.39	84.16
9:47	10.25	8.04	84.18
9:48	10.78	7.46	97.89
9:49	10.98	7.26	99.32
9:50	11.14	7.08	102.38
9:51	11.23	6.97	104.45
9:52	11.38	6.89	104.45
9:53	11.86	6.56	109.45
9:54	12	6.46	111.04
9:55	12.08	6.4	109.99
9:56	12.06	6.41	108.95
9:57	12.12	6.37	109.02
9:58	12.04	6.42	103.37
9:59	12.1	6.38	105.5



Location: Great Lakes Water Authority - Detroit, MI  
 Source: Incinerator 9 (E/INC 9)  
 Project No.: AST-2023-1997  
 Date: 11/8/23

Time Unit Status	O <sub>2</sub> - Outlet % dry Valid	CO <sub>2</sub> - Outlet % dry Valid	NO <sub>x</sub> - Outlet ppmvd Valid
Uncorrected Run Average (C <sub>obs</sub> )	10.67	7.39	114.53
Cal Gas Concentration (C <sub>MA</sub> )	9.86	10.18	110.60
Pretest System Zero Response	0.24	0.28	3.44
Posttest System Zero Response	0.06	0.13	3.82
Average Zero Response (C <sub>0</sub> )	0.15	0.21	3.63
Pretest System Cal Response	9.75	10.32	111.05
Posttest System Cal Response	9.72	10.29	105.46
Average Cal Response (C <sub>M</sub> )	9.74	10.31	108.26
Corrected Run Average (C <sub>corr</sub> )	10.82	7.24	117.23
10:15	12.5	5.76	114.03
10:16	12.63	5.72	114.5
10:17	12.76	5.68	115.03
10:18	12.79	5.66	116.09
10:19	12.44	5.92	117.05
10:20	12.49	5.9	117.12
10:21	12.49	5.94	118.16
10:22	12.39	6	106.39
10:23	12.53	5.88	121.07
10:24	12.37	5.95	121.12
10:25	12.45	5.91	121.58
10:26	12.35	5.95	122.63
10:27	12.12	6.11	123.14
10:28	12.09	6.18	122.62
10:29	11.7	6.36	119.53
10:30	11.58	6.53	122.01
10:31	11	6.98	120.15
10:32	10.61	7.31	116.51
10:33	10.21	7.61	113.36
10:34	9.81	7.95	109.03
10:35	9.33	8.31	103.01
10:36	9.12	8.52	96.9
10:37	8.64	8.89	89.82
10:38	8.35	9.1	87.87
10:39	8.21	9.27	87.73
10:40	8.09	9.35	90.71
10:41	9.09	8.67	98.35
10:42	9.7	8.26	107.61
10:43	10.28	7.76	115.61
10:44	10.63	7.48	120.6
10:45	10.67	7.45	119.5
10:46	10.92	7.25	123.59
10:47	11.13	7.1	127.63
10:48	11.28	6.96	129.68
10:49	11.27	6.94	131.66
10:50	11	7.1	130.7
10:51	10.64	7.37	128.21
10:52	9.95	7.87	121.08
10:53	9.58	8.17	115.08
10:54	9.48	8.33	112.52
10:55	10.03	7.88	114.45
10:56	9.97	8.01	113.64
10:57	9.77	8.11	111.58
10:58	9.62	8.3	107.43
10:59	9.75	8.24	106.46
11:00	10.3	7.78	110.51
11:01	10.47	7.68	113.92
11:02	10.56	7.6	116.14
11:03	10.36	7.69	117.53
11:04	10.56	7.57	118.08
11:05	10.59	7.55	120.03
11:06	10.46	7.64	119.94
11:07	10.75	7.48	120.16
11:08	10.6	7.54	117.53
11:09	10.23	7.88	113.52
11:10	10.05	8.02	113.56
11:11	10	8.07	111.6
11:12	10.03	8.09	112.48
11:13	9.84	8.23	112.55
11:14	9.53	8.46	111.45

Location: Great Lakes Water Authority - Detroit, MI  
 Source: Incinerator 9 (EUNIC 9)  
 Project No.: AST-2023-1997  
 Date: 11/8/23

Time Unit Status	O <sub>2</sub> - Outlet % dry Valid	CO <sub>2</sub> - Outlet % dry Valid	NO <sub>x</sub> - Outlet ppmvd Valid
Uncorrected Run Average (C <sub>obs</sub> )	12.11	6.73	129.32
Cal Gas Concentration (C <sub>MA</sub> )	9.86	10.18	110.60
Pretest System Zero Response	0.06	0.13	3.82
Posttest System Zero Response	0.07	0.18	4.33
Average Zero Response (C <sub>0</sub> )	0.07	0.16	4.08
Pretest System Cal Response	9.72	10.29	105.46
Posttest System Cal Response	9.69	10.17	105.46
Average Cal Response (C <sub>M</sub> )	9.71	10.23	105.46
Corrected Run Average (C <sub>corr</sub> )	12.31	6.64	136.63
11:30	7.41	10.32	127.05
11:31	7.15	10.45	129.7
11:32	7.1	10.6	130.69
11:33	7.06	10.7	131.2
11:34	7.52	10.55	127.04
11:35	7.5	10.59	121.6
11:36	7.95	10.43	116.08
11:37	8.38	10.16	106.47
11:38	9.15	9.59	98.36
11:39	9.84	9.1	94.28
11:40	10.62	8.48	94.43
11:41	11.36	7.8	98.89
11:42	12.28	7.1	108.52
11:43	12.9	6.5	118.05
11:44	13.34	6.11	124.7
11:45	13.17	6.09	125.5
11:46	13.24	6.07	126.3
11:47	13	6.15	92.35
11:48	13.11	6.11	126.75
11:49	13.17	6.02	128.87
11:50	13.4	5.87	130.31
11:51	13.54	5.73	133.19
11:52	13.92	5.46	134.58
11:53	13.9	5.27	139.62
11:54	13.32	5.8	136.24
11:55	13.2	5.97	134.71
11:56	13.39	5.85	134.78
11:57	13.58	5.66	137.21
11:58	13.72	5.59	137.25
11:59	13.89	5.47	138.23
12:00	13.97	5.41	142.4
12:01	14.08	5.25	143.35
12:02	14.04	5.25	145.79
12:03	14.01	5.26	146.29
12:04	14.13	5.13	148.36
12:05	14.05	5.1	148.39
12:06	13.36	5.42	146.89
12:07	13.15	5.7	141.77
12:08	12.67	6	138.3
12:09	12.61	6.07	136.25
12:10	12.61	6.09	137.24
12:11	12.51	6.1	133.76
12:12	12.54	6.05	132.78
12:13	12.58	6.03	133.19
12:14	12.57	6	133.8
12:15	12.71	5.94	135.42
12:16	12.73	5.88	135.23
12:17	12.72	5.92	135.66
12:18	12.72	5.93	135.22
12:19	12.75	5.92	136.68
12:20	12.56	6.05	137.3
12:21	12.07	6.4	129.78
12:22	12.02	6.49	127.74
12:23	12	6.55	126.71
12:24	12.28	6.4	126.16
12:25	12.26	6.44	125.15
12:26	12.39	6.32	129.73
12:27	12.39	6.37	128.06
12:28	12.41	6.37	129.16
12:29	12.31	6.39	129.7



Emissions Calculations

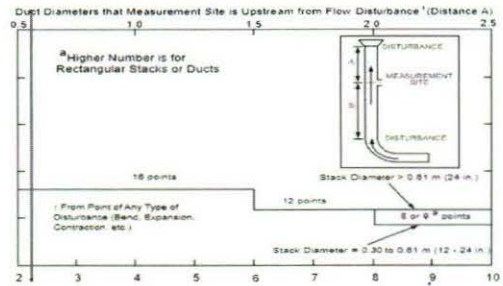
Location Great Lakes Water Authority - Detroit, MI  
 Source Incinerator 10 (EUINC 10)  
 Project No. AST-2023-1997

Run Number		Run 1	Run 2	Run 3	Average
Date		11/8/23	11/8/23	11/8/23	--
Start Time		13:00	14:10	15:20	--
Stop Time		14:00	15:10	16:20	--
<b>Calculated Data - Outlet</b>					
O <sub>2</sub> Concentration, % dry	C <sub>O<sub>2</sub></sub>	13.40	14.07	13.81	13.76
CO <sub>2</sub> Concentration, % dry	C <sub>CO<sub>2</sub></sub>	5.57	5.19	5.29	5.35
NOx Concentration, ppmvd	C <sub>NOx</sub>	77.21	77.12	75.60	76.64
NOx Concentration, ppmvd @ 7 % O <sub>2</sub>	C <sub>NOxc7</sub>	143.1	157.1	148.2	149.4

Location Great Lakes Water Authority - Detroit, MI  
 Source Incinerator 10 (EUINC 10)  
 Project No. AST-2023-1997  
 Date: 11/08/23

### Stack Parameters

Duct Orientation: Vertical  
 Duct Design: Circular  
 Distance from Far Wall to Outside of Port: 57.00 in  
 Nipple Length: 3.00 in  
 Depth of Duct: 54.00 in  
 Width of Duct: 54.00 in  
 Cross Sectional Area of Duct: 15.90 ft<sup>2</sup>  
 Equivalent Diameter: 54.00 in  
 No. of Test Ports: 1  
 Number of Readings per Point: 1  
 Distance A: 14.0 ft  
 Distance A Duct Diameters: 3.1 (must be  $\geq 0.5$ )  
 Distance B: 10.0 ft  
 Distance B Duct Diameters: 2.2 (must be  $\geq 2$ )  
 Actual Number of Traverse Points: 3  
 Measurer (Initial and Date): MFK/LAC 11/7/23  
 Reviewer (Initial and Date): MFK/LAC 11/7/23

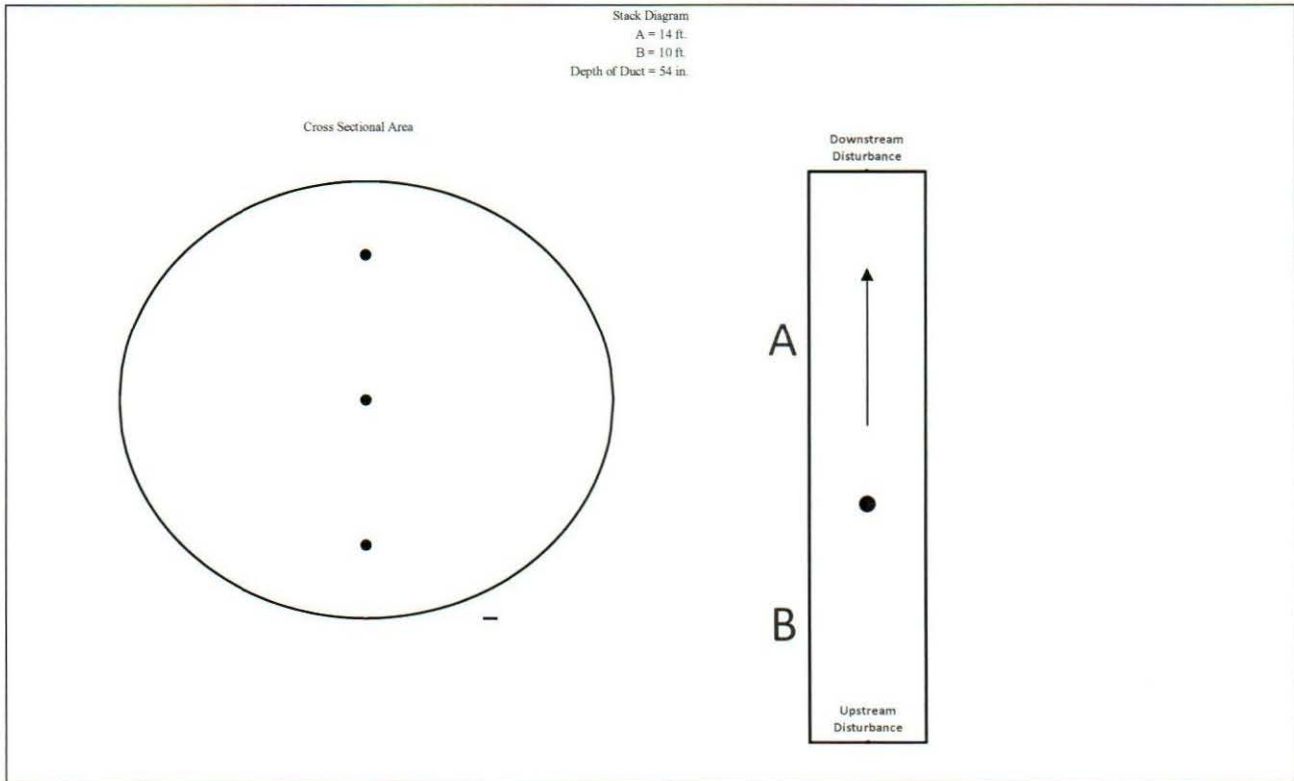


### CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS												
Number of traverse points on a diameter												
	2	3	4	5	6	7	8	9	10	11	12	
1	14.6	16.7	6.7	--	4.4	--	3.2	--	2.6	--	2.1	
2	--	85.4	50.0	25.0	--	14.6	--	10.5	--	8.2	6.7	
3	--	--	83.3	75.0	--	29.6	--	19.4	--	14.6	11.8	
4	--	--	--	93.3	--	70.4	--	32.3	--	22.6	17.7	
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0	
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6	
7	--	--	--	--	--	89.5	--	77.4	--	64.4	64.4	
8	--	--	--	--	--	96.8	--	85.4	--	75.0	75.0	
9	--	--	--	--	--	--	91.8	--	82.3	--	82.3	
10	--	--	--	--	--	--	97.4	--	88.2	--	88.2	
11	--	--	--	--	--	--	--	93.3	--	93.3	93.3	
12	--	--	--	--	--	--	--	97.9	--	97.9	97.9	

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	16.7	9.02	12.02
2	50.0	27.00	30.00
3	83.3	44.98	47.98
4	--	--	--
5	--	--	--
6	--	--	--
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

\*Percent of stack diameter from inside wall to traverse point.





Location: Great Lakes Water Authority - Detroit, MI  
 Source: Incinerator 10 (EUINC 10)  
 Project No.: AST-2023-1997  
 Date: 11/8/23

Time Unit Status	O <sub>2</sub> - Outlet % dry Valid	CO <sub>2</sub> - Outlet % dry Valid	NO <sub>x</sub> - Outlet ppmvd Valid
Uncorrected Run Average (C <sub>obs</sub> )	13.15	5.64	74.94
Cal Gas Concentration (C <sub>MA</sub> )	9.86	10.18	110.60
Pretest System Zero Response	0.07	0.18	4.33
Posttest System Zero Response	0.09	0.11	3.43
Average Zero Response (C <sub>0</sub> )	0.08	0.15	3.88
Pretest System Cal Response	9.69	10.17	105.46
Posttest System Cal Response	9.70	10.20	105.88
Average Cal Response (C <sub>M</sub> )	9.70	10.19	105.67
Corrected Run Average (Corr)	13.40	5.57	77.21
13:00	13.28	5.45	79.76
13:01	13.4	5.36	81.22
13:02	13.3	5.4	80.69
13:03	13.3	5.43	80.82
13:04	13.28	5.42	80.63
13:05	13.45	5.27	82.17
13:06	13.66	5.17	83.72
13:07	13.68	5.14	84.26
13:08	13.62	5.1	85.25
13:09	13.35	5.3	85.17
13:10	12.98	5.57	82.78
13:11	12.7	5.74	79.82
13:12	12.14	6.14	76.26
13:13	12.29	6.17	74.69
13:14	12.27	6.17	75.15
13:15	12.43	5.64	69.07
13:16	12.44	6.19	75.15
13:17	12.4	6.19	74.64
13:18	12.51	6.05	74.07
13:19	12.12	6.43	71.68
13:20	12.42	6.21	72.09
13:21	13.09	5.8	75.72
13:22	13.44	5.47	78.68
13:23	13.58	5.41	77.66
13:24	13.47	5.43	77.63
13:25	13.44	5.47	77.13
13:26	13.42	5.41	76.7
13:27	13.31	5.49	76.24
13:28	13.24	5.57	76.27
13:29	13.26	5.51	77.25
13:30	13.27	5.54	77.24
13:31	14.22	5.27	85.31
13:32	12.9	5.73	69.08
13:33	12.97	5.71	73.57
13:34	13.01	5.72	74.19
13:35	13.26	5.67	73.33
13:36	13.39	5.52	74.64
13:37	13.35	5.53	75.8
13:38	13.38	5.56	75.27
13:39	13.31	5.62	74.3
13:40	13.23	5.56	74.19
13:41	13.24	5.61	73.77
13:42	13.31	5.59	72.7
13:43	13.32	5.65	72.13
13:44	13.28	5.57	71.75
13:45	13.31	5.65	71.16
13:46	13.26	5.58	72.12
13:47	13.3	5.64	71.6
13:48	13.97	5.26	68.66
13:49	13.17	5.74	66.62
13:50	13.3	5.64	70.8
13:51	13.16	5.7	69.03
13:52	13.08	5.74	68.05
13:53	13.23	5.72	68.13
13:54	13.12	5.75	67.69
13:55	13.09	5.81	68.07
13:56	13.05	5.79	68.59
13:57	12.92	5.87	68.76
13:58	13	5.89	68.06
13:59	13.16	5.8	69.18

Location: Great Lakes Water Authority - Detroit, MI  
 Source: Incinerator 10 (EUINC 10)  
 Project No.: AST-2023-1997  
 Date: 11/8/23

Time Unit Status	O <sub>2</sub> - Outlet % dry Valid	CO <sub>2</sub> - Outlet % dry Valid	NO <sub>x</sub> - Outlet ppmvd Valid
Uncorrected Run Average (C <sub>obs</sub> )	13.79	5.29	74.57
Cal Gas Concentration (C <sub>MA</sub> )	9.86	10.18	110.60
Pretest System Zero Response	0.09	0.11	3.43
Posttest System Zero Response	0.10	0.13	3.33
Average Zero Response (C <sub>0</sub> )	0.10	0.12	3.38
Pretest System Cal Response	9.70	10.20	105.88
Posttest System Cal Response	9.68	10.30	105.07
Average Cal Response (C <sub>M</sub> )	9.69	10.25	105.48
Corrected Run Average (Corr)	14.07	5.19	77.12
14:10	13.56	5.16	77.18
14:11	13.74	5.08	77.62
14:12	13.73	5.21	78.21
14:13	13.82	5.16	77.73
14:14	13.97	5.15	77.73
14:15	14.01	5.09	79.19
14:16	13.96	5.12	79.29
14:17	14.05	5.06	80.16
14:18	14	5.17	79.6
14:19	14.08	5.12	79.69
14:20	14.37	5.3	84.4
14:21	13.91	5.16	79.78
14:22	13.81	4.88	68.22
14:23	13.91	5.18	77.13
14:24	13.81	5.23	77.84
14:25	13.72	5.26	76.75
14:26	13.71	5.26	75.64
14:27	13.75	5.25	74.62
14:28	13.7	5.29	74.23
14:29	13.71	5.31	73.23
14:30	13.71	5.34	72.11
14:31	13.55	5.43	72.6
14:32	13.58	5.42	73.26
14:33	13.55	5.46	72.16
14:34	13.49	5.5	71.22
14:35	13.61	5.42	70.63
14:36	13.61	5.42	72.76
14:37	13.68	5.36	72.08
14:38	14.31	5.05	70.08
14:39	13.54	5.49	65.07
14:40	13.61	5.39	72.58
14:41	13.67	5.43	73.2
14:42	13.73	5.39	72.69
14:43	13.79	5.33	73.74
14:44	13.59	5.41	74.21
14:45	13.73	5.34	73.53
14:46	13.82	5.27	75.72
14:47	13.78	5.33	74.72
14:48	13.75	5.32	74.74
14:49	13.8	5.31	74.06
14:50	13.92	5.3	73.32
14:51	13.76	5.35	73.73
14:52	13.84	5.31	73.61
14:53	13.73	5.36	73.67
14:54	13.76	5.39	75.7
14:55	14.18	4.99	64.14
14:56	13.75	5.48	71.72
14:57	13.77	5.4	74.16
14:58	13.8	5.37	74.08
14:59	13.81	5.34	74.06
15:00	13.81	5.39	73.16
15:01	13.76	5.36	74.12
15:02	13.85	5.32	74.07
15:03	13.86	5.24	75.06
15:04	13.89	5.22	76.16
15:05	13.75	5.24	76.67
15:06	13.71	5.37	74.62
15:07	13.71	5.35	74.13
15:08	13.8	5.31	74.1
15:09	13.81	5.24	74.65

Location: Great Lakes Water Authority - Detroit, MI  
 Source: Incinerator 10 (EUNIC 10)  
 Project No.: AST-2023-1997  
 Date: 11/8/23

Time Unit Status	O <sub>2</sub> - Outlet % dry Valid	CO <sub>2</sub> - Outlet % dry Valid	NO <sub>x</sub> - Outlet ppmvd Valid
Uncorrected Run Average (C <sub>obs</sub> )	13.54	5.42	72.84
Cal Gas Concentration (C <sub>MA</sub> )	9.86	10.18	110.60
Pretest System Zero Response	0.10	0.13	3.33
Posttest System Zero Response	0.09	0.12	2.06
Average Zero Response (C <sub>0</sub> )	0.10	0.13	2.70
Pretest System Cal Response	9.68	10.30	105.07
Posttest System Cal Response	9.71	10.34	105.54
Average Cal Response (C <sub>A</sub> )	9.70	10.32	105.31
Corrected Run Average (C <sub>corr</sub> )	13.81	5.29	75.60
15:20	13.24	5.33	76.21
15:21	13.31	5.35	75.17
15:22	13.42	5.36	75.17
15:23	13.44	5.34	74.1
15:24	13.51	5.37	73.52
15:25	13.32	5.46	74.11
15:26	13.23	5.58	74.1
15:27	13.3	5.59	74.15
15:28	13.42	5.48	74.62
15:29	13.42	5.23	62.47
15:30	13.22	5.7	70.06
15:31	13.2	5.7	71.59
15:32	13.3	5.64	72.17
15:33	13.31	5.62	71.1
15:34	13.36	5.62	71.1
15:35	13.6	5.53	73.26
15:36	13.54	5.51	72.69
15:37	13.6	5.52	72.61
15:38	13.58	5.49	72.17
15:39	13.5	5.49	71.63
15:40	13.54	5.58	72.16
15:41	13.52	5.58	71.58
15:42	13.55	5.59	72.6
15:43	13.76	5.4	73.65
15:44	13.79	5.34	74.74
15:45	13.8	5.26	76.15
15:46	14.25	4.79	66.6
15:47	13.7	5.31	73.58
15:48	13.73	5.27	76.22
15:49	13.9	5.14	76.64
15:50	13.78	5.19	76.68
15:51	13.7	5.17	77.6
15:52	13.69	5.26	77.72
15:53	13.72	5.25	77.16
15:54	13.66	5.26	77.66
15:55	13.67	5.32	76.2
15:56	13.68	5.27	76.22
15:57	13.6	5.33	75.68
15:58	13.54	5.37	74.66
15:59	13.45	5.46	74.1
16:00	13.41	5.46	74.17
16:01	13.44	5.53	72.58
16:02	13.59	5.15	62.98
16:03	13.29	5.64	70.61
16:04	13.3	5.54	72.64
16:05	13.29	5.6	72.6
16:06	13.32	5.64	71.13
16:07	13.33	5.6	71.65
16:08	13.54	5.49	72.65
16:09	13.47	5.5	73.17
16:10	13.66	5.4	73.63
16:11	13.67	5.38	74.67
16:12	13.6	5.42	73.12
16:13	13.64	5.47	72.6
16:14	13.57	5.49	71.53
16:15	13.55	5.49	71.6
16:16	13.52	5.56	70.6
16:17	13.69	5.5	71.09
16:18	13.91	5.07	60.01
16:19	13.62	5.5	67.51